

Serial No.: 10/519,242
Filed: December 22, 2004

Remarks

The Examiner has rejected claims 1-11 under 35 USC 102(b) as anticipated by or, in the alternative, under 35 USC 103(a) as obvious over Mineo et al (JP 08-044066, machine translated).

The human translation of paragraphs 0009-0011 of JP 08-044066 is presented below.

0009)

Secondary, even if the refractive index is low, particles are generated after coating in short time (e.g. within 24 hrs) and it became unusable. Thirdly, when a photoresist is applied on the antireflective coating, scum is produced after development.

0010)

[Problems to be solved by this invention]

Based on this background, the purpose of this invention is to provide antireflective coating composition that has low reflective index (≤ 1.4), coatable with aqueous solution, water developable and little scum.

0011)

[Methods to solve the problems]

The inventors discovered that antireflective coating with some specific compounds enabled to solve the problems. In summary, this invention is to use antireflective coating composition consisting of water soluble fluorinated compounds and water, where the above mentioned water soluble fluorinated compounds are selected from fluorinated alkyl polyether sulfonic acids and their non-metal salts and fluorinated alkyl polyether carboxylic acid and their non-metal salts.

Serial No.: 10/519,242
Filed: December 22, 2004

The present invention, as claimed in claim 1, relates to an anti-reflective coating composition which comprises a fluorine-containing polymer, an acid, an amine and an aqueous solvent capable of dissolving these components, further where the coating composition has a pH ranging from about 1.0 to about 6.0. As explained in the previous response of December 23, 2005, the antireflective composition of the present invention is necessarily acidic, and within the pH range of 1.0 to 6.0. The cited prior art, Mineo, does not teach or show any preference for only an acidic composition. In fact, in paragraph 0010, Mineo teaches that the problem to be solved is a low refractive index, aqueous coatable composition and little scum, which is solved by using a fluorinated acid (without an amine) or a salt. Mineo has no intention to produce an acidic solution comprising an amine, as exemplified by the sole Example which adds a neutral salt. The state of the art in antireflective coatings at the time Mineo filed the patent application (1994), i.e. contemporary art, was to develop neutral solutions as seen in US 5,631,314. US 5,631,314 was filed in the US on April 26, 1995 and has the priority date of April 27, 1994. US '314 teaches away from using acidic antireflective coating compositions and teaches the use of neutral solutions, as disclosed in column 2, lines 31-36, 44-47, and 50- 54:

"Anti-interference films are conventionally formed by spin coating or otherwise applying liquid coating compositions onto the photoresist film and in order to prevent the corrosion of applicators and, related equipment, it has been desired to develop a liquid coating composition that permits final pH adjustments to neutrality"

"However, liquid coating compositions containing these compounds are acidic (with pHs of about 2-4) and, hence, there is high likelihood that applicators and related equipment are corroded by acid."

Serial No.: 10/519,242
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"Hence, it is desired to develop a liquid coating compositions for forming Photoresist coating films that serve satisfactorily as antireflective films and that yet are capable of preventing the corrosion of applicators and related equipment."

Thus, the prior art of US 5.631,314 related to Mineo teaches that neutral solutions are desirable, and teaches away from acidic solutions. This is reinforced by the fact that the only example in Mineo also discloses a neutral solution and furthermore, there is no teaching for a preference for an acidic solution. Thus the prior art teaches away from an acidic solution and directs one to use a neutral solution. Additionally, there is no suggestion that if acids are used by Mineo, they are used to obtain a necessarily acidic solution. In fact Mineo mentions acidic compounds only by chance, where the acid compounds are used to decrease the refractive index by the incorporation of fluorine or as a cosolvent. Acidic compounds are not taught to achieve better lithographic properties.

In order to anticipate the invention, Mineo must disclose all the elements of the invention, including the pH limitation of the present application. The prior art does not show in an enabling manner the acidic solution. The specification does not teach the essential claim limitation of an acidic solution between pH 1-6, and the example of Mineo is not inherently acidic, which together with the combination of US '314 teaching of a nondesirable acidic solution cannot possibly teach a person of ordinary skill in the art that the presently claimed acidic solution is desirable. As a result the applicants believe, Mineo does not anticipate or make obvious an acidic solution.

Serial No.: 10/519,242
Filed: December 22, 2004

The Examiner states in point (7) that "How would this amount used by applicant extrapolate to any other amount of the components in the samples of Mineo et al and obtain the same result?" Mineo's application does not teach any ranges from the polymer, acid and amine in one composition, other than a neutral salt in the Example. No ratios of the acid and amine are given. Mineo states in paragraph 0019, "Especially in this, a sulfonic-acid compound is desirable. Moreover, the salt of the ammonium which can also use nonmetallic salts..." i.e. in the case where only a sulfonic acid compound is used, the solution comprises a fluorinated compound, a sulfonic acid compound to reduce refractive index, and a solvent, and thus in this case no amine is present and is therefore outside the scope of the present claim 1. Alternatively, whenever an amine is discussed it is always discussed as a salt. There are no concentration ranges of acid compound and amine enabled by Mineo, i.e. there is never the case where the solution would contain a fluorinated polymer that is fully soluble, an acid compound and an amine, and that solution would be acidic, because the amine is always described as a salt. Within the description of Mineo's disclosure, the applicants are unable to discern the ranges of acid and amine concentrations to provide the Examiner with data as to the pH of the solution comprising a polymer, acid compound and amine.

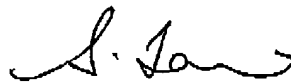
The declaration submitted previously clearly presents evidence that the solutions containing the components disclosed by Mineo are not completely water soluble, and therefore do not enable one to make a fully dissolving acidic solution capable of being used as an antireflective coating, especially since Mineo requires that the material be scum-free (translation of paragraph [0010] of Mineo's application given above). The polymer in a water is not soluble, and the polymer and salt are not soluble.

Serial No.: 10/519,242
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The combination of the facts that in Mineo, the fluorinated polymer is not completely soluble, no pH requirement is taught, no ranges of the amine and acid are taught, the prior art teaches away from using acidic solution, and the acid compound is taught as a salt of an amine or as a sole acid (both non-dissolving), leads the applicants to the conclusion that Mineo is not enabling as an anticipatory reference or as obviousness reference.

In view of the above remarks, the present application is believed to be in condition for allowance, and reconsideration of it is requested. If the Examiner disagrees, he/she is requested to contact the attorney for Applicants at the telephone number provided below.

Respectfully submitted,



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